

Exhibit A



SUFFOLK COUNTY COMPREHENSIVE WATER RESOURCES MANAGEMENT PLAN

2015

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County Executive



**SUFFOLK COUNTY
COMPREHENSIVE
WATER RESOURCES
MANAGEMENT PLAN**

Executive Summary

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Introduction

Water is the single most significant resource for which Suffolk County bears responsibility. As the impact of Superstorm Sandy underscored, more than at any time in our history, we are obliged to come to terms, in every sense, with the water that surrounds us. Suffolk County's water quality is at a tipping point. We face an alarming trend in the quality of the water our families drink, compounded by impairment of many bodies of water in which our families play. Moreover, the source of these impairments has demonstrably degraded the wetlands that serve as our last line of natural defense against storm surge.

While today our drinking water generally meets quality standards, elevating levels of contaminants raise serious concern. Many of our rivers, estuaries and bays are impaired as result of eutrophication. Nitrogen, which primarily spews from residential septs and cesspools, as well as fertilizer, are the principal culprits that spur hypoxia, harmful algal blooms, diminution of sea and shellfisheries, and degradation of our protective natural infrastructure—wetlands and seagrass beds that act as wave and storm surge buffers^{1 2}. Sea level rise, which also contributes to marshland degradation, is projected to raise groundwater levels, increasing vulnerability to saltwater infiltration, and further compromising on-site wastewater treatment infrastructure largely composed of cesspools and septic tanks.

Perhaps nowhere have we seen the impact of nitrogen pollution in more stark terms than the Great South Bay. At one time, this bay produced more than half the clams eaten in our country. However, over the past quarter-century, the clam harvest in the Great South Bay has fallen by 93 percent, destroying an entire industry which once accounted for 6,000 jobs. While clams were once over-harvested, they have largely failed to recover due to recurrent brown tides fed primarily from nitrogen from septic systems and cesspools. We must

¹ Deegan LA, Johnson DS, Warren RS, Peterson BJ, Fleeger JW, Fagherazzi S, and Wollheim WM (18 Oct 2012) "Coastal Eutrophication as a Driver of Salt Marsh Loss" *Nature* doi 10.1038

² Anderson ME, McKee Smith J, Bryant DB, and McComas, RGW (Sept 2013), "Laboratory Studies of Wave Attenuation through Artificial and Real Vegetation" USACE, "It is generally acknowledged that vegetated coastal features such as wetlands can reduce the effects of surge, waves, and tsunami propagation "

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decide if this type of impaired surface water body will be our region's future or if we can restore our bays to health.

In advance of the release of the 2015 Suffolk County Comprehensive Water Resources Management Plan ("Comp Plan"), this Executive Summary Update is spotlighting the Comp Plan's critical findings, and relevant post-Superstorm Sandy considerations, in order to spur a critical public dialogue about the scope of the problem and begin to frame near-term solutions. While many environmental issues related to groundwater and surface waters have arisen since the previous Plan (1987), one elemental condition has remained constant: the vast majority of Suffolk residents rely on on-site wastewater disposal systems that discharge to groundwater. In addition, fertilizer use, industrial and commercial solvents, petroleum products, pesticides and a host of other manmade contaminants have had profound and long-lasting impacts on groundwater quality, as well as on fresh surface waters and coastal marine waters into which groundwater and stormwater runoff discharge.

In the face of sea-level rise and extreme weather events, Suffolk County is compelled to devise the means and methods to live and thrive with the water beneath, by and around us.

Critical Findings

*"We have a million and a half people, **approximately 74%**, or roughly a million people, who are **not sewered**. This is probably the only place in the world with that large a density in this tight a space where the waste is going into a sole source aquifer immediately beneath us that we're drinking, and this is **a big concern**."*³

Downward Trajectory in Groundwater Quality:

1. Nitrogen is public water enemy #1, as **nitrate contamination** from unsewered housing and fertilizer use poses a threat to both drinking water supplies and coastal marine habitat and resources. Nitrogen-induced nutrient loading and eutrophication can lead to many negative impacts on estuarine environments including harmful algal blooms (HABs), hypoxia [little or...], and even anoxia [no oxygen];
2. Volatile organic chemicals (VOCs), another **priority contaminant group**, derived from commercial, industrial, and consumer use,

³ Dawydiak, Walter, Acting Director Environmental Quality, Suffolk County Department of Health Services Testimony to Health Committee of SC Legislature, March 6, 2012

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Suffolk County Public & Environmental Health Laboratory Highlights

Types of Samples Analyzed:

- Public & private drinking water
- Groundwater monitoring wells
- Bottled water
- Creeks, lakes, etc.
- Bathing beaches, bays, etc.
- Sewage
- Hazardous waste (contaminant investigations & clean-ups)

Major Accomplishments:

- Approximately 60,000 tests performed annually
- The only lab on Long Island approved to test drinking water for radionuclides
- First lab to detect the gasoline additive MTBE in potable water
- Developed an analytical method for the analysis of the herbicide Dacthal
- Nationally known as first lab to detect carbamate pesticides in drinking water on Long Island
- The only lab on Long Island analyzing for Brown Tide using an approved method
- Analytical capability to test for 150 pesticides and metabolites, more than any other laboratory on Long Island

Goals:

- Increase drinking water analytical capability from 298 to ~380 contaminants
- Contaminants of interest include: PPCP's, pesticides, radionuclides, and 1,4-dioxane

pesticide-related compounds in Suffolk's groundwater. SCDHS found at least 141 community supply wells (approximately 16 percent of the wells sampled) were impacted by pesticide-related contaminants during the period from 1997 through July 2014.

Emerging Environmental Issues

New, more sophisticated analytical techniques have enabled the County to detect the presence of contaminants at parts per trillion levels, much lower concentrations than could previously have been identified. SCDHS has closely monitored available information on emerging contaminants and has analyzed thousands of samples from community, non-community and private wells over the last decade. SCDHS monitoring has identified the presence of trace levels of PPCPs in about 2.5 percent of the samples collected from community supply wells and in an average of 6 to 10 percent of the samples collected from the shallower non-community and private wells. As new information on the detection, fate and transport characteristics, or potential effects of PPCPs is published nearly every day, SCDHS continues to monitor the literature and regulatory initiatives to assess the need to respond to any potential public health concerns. SCDHS must continue to monitor and prepare for emerging and evolving environmental issues such as Unregulated Contaminant Monitoring Rule compounds including 1,4-dioxane and pharmaceuticals and personal care products, soil vapor intrusion, composting, microplastics, and septage management.

Most PPCPs are not currently monitored – and in fact, cannot be monitored at this time. There are potentially hundreds, if not thousands of PPCPs and their metabolites and breakdown products that may be released to the environment. It should not be necessary to monitor for all of these parameters, however the subset of compounds with potential human-health impacts that ultimately should be monitored has not yet been identified. In addition, analytical methods to detect the extremely low levels of some PPCPs and their metabolites that may exist in the environment are not yet available. While analytical protocols to detect some PPCPs have been developed, cost effective methods to rapidly detect the presence of many of the other compounds that may be present have not.

SCDHS is currently in the process of developing the analytical capability to test for 1,4-dioxane in anticipation of a specific federal and/or state drinking water standard. This is considered an emerging contaminant of concern and the chemical is currently regulated as an Unspecified Organic Contaminant in drinking water at 50 µg/L in New York State. 1,4-dioxane has been used as a solvent stabilizer and is present as a byproduct in personal care products such as shampoos and cosmetics. Based on a preliminary evaluation, 1,4-dioxane

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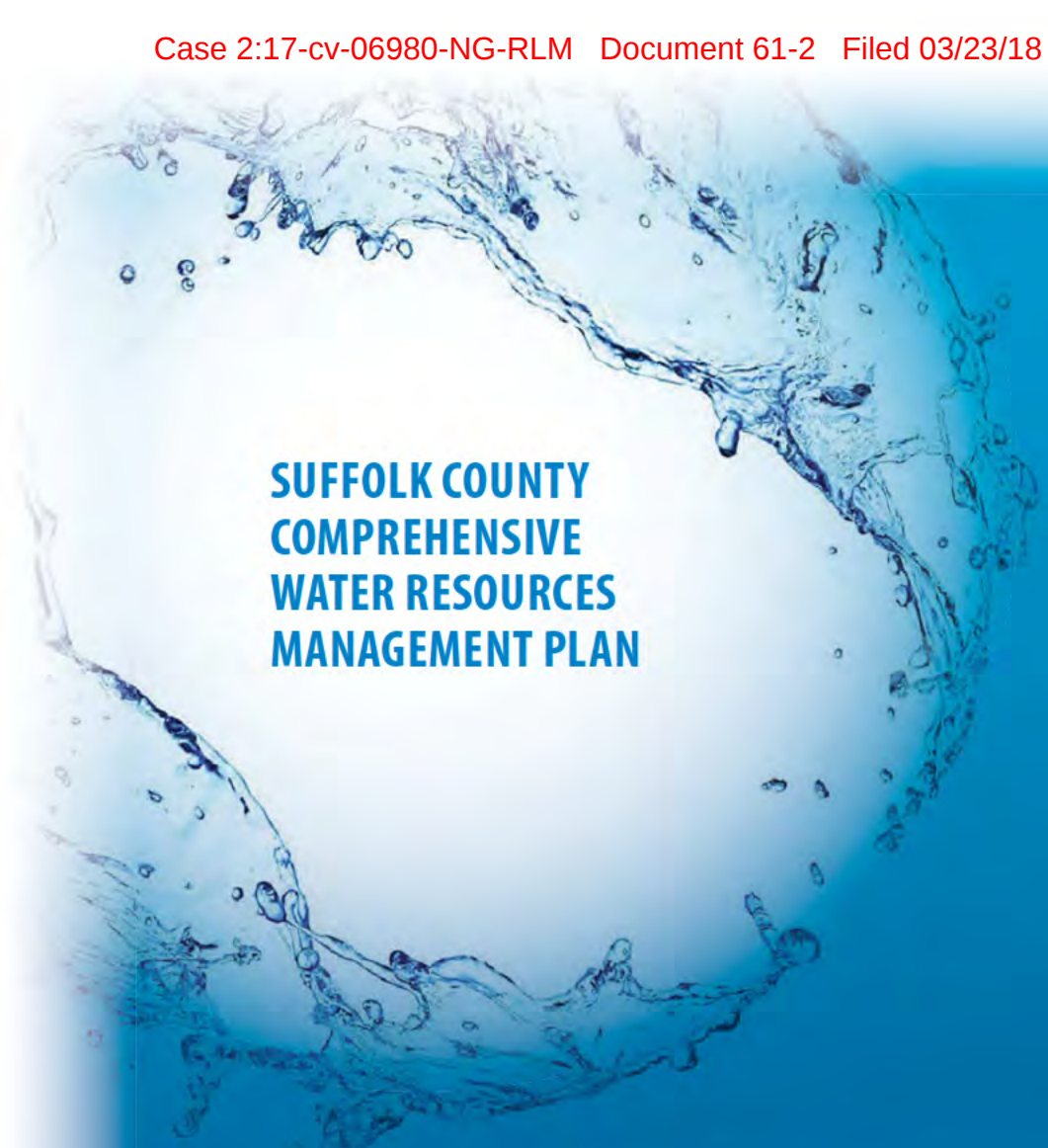
appears to be of particular concern in Suffolk County due to the presence of historic sources, groundwater plumes, and the nature of the sandy, sole source aquifer. As of the October 2014 United States Environmental Protection Agency (USEPA) data release from nationwide public water supply monitoring in 2013 and 2014, 31 out of the 40 public water suppliers in New York State with detections of 1,4-dioxane were on Long Island. The highest concentration thus far of 1,4-dioxane in a public water supply throughout the nation was also on Long Island. Suffolk County's largest water supplier, SCWA, has detected this contaminant in approximately 40% of their public supply wells at concentrations of up to 15.2 µg/L.

Microplastics are another emerging contaminant being studied by SCDHS. These are plastic particles, usually made of polyethylene or polypropylene, and less than 5 millimeters in any one direction. Microplastics or microbeads are commonly found in personal care products such as toothpaste, creams, lotions and cosmetics. They have been in use by manufacturers of these products for approximately 10 years. Microplastics can be released to the environment by sewage treatment plants which discharge to surface waters. These tiny plastic particles can then adhere to toxic chemicals such as poly aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), etc. and bioaccumulate in animals upon ingestion. There are many alternatives available to manufacturers including rice, seeds, salt, sugar, bark, cornmeal, oats and shells.

Groundwater Quality and Land Use

Compared to many sources of water supply throughout the country, Suffolk County's groundwater supply remains for the most part, a high quality source of potable water, despite the impacts of the 1.5 million people who live in the watershed. The combined efforts of programs to protect the aquifer system at the federal, state, county and town levels have been very successful in controlling the impacts of development on groundwater - although the continual gradual decline of groundwater quality indicates that additional efforts are required.

As part of this study, the County's calibrated groundwater models were used to delineate the ground surface area contributing recharge or source water for each of the County's 704 existing and planned community supply wells, shown on **Figure ES-1**. The contributing area maps are used frequently by SCDHS as a water resource management tool in evaluating potential receptors from known or suspected contamination, during the review of applications for wastewater management systems, and during evaluation of the transfer of development rights. Using Geographic Information Systems (GIS), these contributing areas were overlain upon land use mappings provided by the SCDEDP as well as

A large, artistic splash of water in shades of blue and white, forming a circular shape that frames the title text on the left side of the page.

SUFFOLK COUNTY COMPREHENSIVE WATER RESOURCES MANAGEMENT PLAN

Section 3

GROUNDWATER RESOURCES

SECTION 3 GROUNDWATER RESOURCES

Source Water Assessments

Recognizing that activities in a water supply's source water area have a significant potential to affect water quality of the potable supply, the New York State Department of Health (NYSDOH) directed the development of Source Water Assessments for all public supply wells in Suffolk County in 2003.

As part of this Plan, updated source water assessments were completed for all community supply wells in Suffolk County. The source water assessments have three major components:

Use of three dimensional groundwater flow and contaminant transport models to delineate the area contributing recharge to each well (source water area), and to estimate the average time of travel from the water table to the well screen;

Use of GIS and extensive databases to identify the prevalence of each contaminant category within the source water area, based upon land uses and the presence of potential point sources of contamination;

Evaluation of the susceptibility of each well to potential contamination, based upon contaminant prevalence, contaminant fate and transport characteristics, and travel time from the water table to the well screen.

A sample source water assessment report for SCWA's Woodchuck Hollow Road is included at the end of this chapter.

Section 3 Groundwater Resources

3.1 Problem Identification

Protection of Suffolk County's groundwater resources has long been of concern in Suffolk County, both because groundwater provides the sole source of potable water supply to County residents, and because it provides baseflow to the County's surface waters. The 1987 Suffolk County Comprehensive Water Resources Management Plan (hereinafter referred to as the **1987 Comp Plan**) provided extensive documentation of the County's aquifer system, groundwater quantity, and groundwater quality that is not repeated here. This section describes how updated information, databases and new tools were used to build upon earlier studies, to enhance the understanding of the aquifer system, to define groundwater quality and quantity issues facing Suffolk County, and to begin to develop the information necessary to help to guide future resource management decisions.

3.1.1 Groundwater Quality

3.1.1.1 Background

Suffolk County's 1.5 million residents live directly on top of the County's water supply. It is not surprising that the impacts of human activities above ground are observed in the groundwater below. Due to the concerted efforts of water resource managers, in general, groundwater quality throughout most of Suffolk County continues to be very good. Potable water supplied by community water systems in Suffolk County meets all drinking water quality standards. However, review of water quality data reveals that concentrations of key contaminants found in groundwater have increased in some areas over the almost three decades since the **1987 Comp Plan** was completed.

Water resource managers have long recognized that land uses and activities occurring above ground can have a direct impact upon groundwater quality, as recharging precipitation can transport dissolved contaminants down through the unsaturated zone to the underlying aquifer. Currently, New York State Department of Environmental Conservation (NYSDEC) has established groundwater quality criteria for over one hundred contaminants, although improved analytical capabilities allow detection of hundreds more, at increasingly lower concentrations.

This study focused on those contaminants of potential concern that have been identified in Suffolk County groundwater. Nitrate has long been identified as

SECTION 3 GROUNDWATER RESOURCES

Concentrations of 1,4-dioxane in untreated water at SCWA supply wells in 2013 and 2014 ranged from non-detect at 0.07 µg/L to 15.2 µg/L.

Recognizing the importance of preventing pharmaceuticals from entering ground and surface waters, in recent years, Suffolk County has passed two resolutions that both strengthen public awareness and encourage proper disposal of pharmaceuticals. Resolution No. 762-2008 established a program called Operation Medicine Cabinet, which allows residents to deposit unused medications in secure receptacles in Suffolk County Police Precincts 24 hours/day and 7 days each week. A companion program to support unused medication turn-in for the five East End Towns has been funded by the Suffolk County Water Quality Protection and Restoration Program (1/4% Sales Tax Program). Resolution No. 181-2011 requires hospitals, nursing homes, hospice facilities and long-term care facilities to file a written plan with the SCDHS annually for the disposal of unused or expired medications in an environmentally safe manner.

1, 4 Dioxane

1,4-Dioxane ($C_4H_8O_2$) is an organic solvent with numerous industrial and synthetic uses. 1,4-dioxane is an ether that is classified by the USEPA as a probable human carcinogen. Its primary industrial use was as a stabilizer for the solvent TCA to protect the TCA from reactions with aluminum containers. Although TCA was banned worldwide starting in 1996 to protect the ozone layer, 1,4-dioxane is still directly used as a solvent in inks and adhesives, and is a manufacturing contaminant found in personal care products such as deodorants, shampoos, toothpastes, mouthwashes, bubble bath formulas, and moisturizers. It is also found as a contaminant in cleansing agents containing sodium lauryl sulfate (SLS), a surfactant used to make many cleaning and hygiene products less abrasive and better foaming. Like other ethers (such as MTBE) it does not readily bind to soils, and readily leaches to groundwater and is highly soluble. It is resistant to naturally occurring biodegradation processes in groundwater, but can be biodegraded by a number of pathways in surface waters, and has a low toxicity to aquatic life. 1, 4-dioxane is difficult and expensive to remove from drinking water (i.e., it is not effectively removed by granular activated carbon (GAC) and air-stripping).

When found in water, it is at µg/L levels. There is currently no federal drinking water standard for 1,4-dioxane; however NYSDOH regulates this compound at 50 ppb as an unspecified organic contaminant (UOC). The current USEPA 10^{-6} lifetime risk value for 1,4-dioxane is 0.35 µg/L and the noncancer lifetime Health Advisory (HA) is 200 µg/L based upon non-cancer effects (USEPA, 2012). 1,4-dioxane is currently being evaluated under the USEPA's Unregulated Contaminant Monitoring Rule (UCMR3) and is likely to be regulated due to its characterization as a probable human carcinogen. California and Illinois have reduced their drinking water guidance level to 1 µg/L, while Massachusetts set its guidance level at 0.3 µg/L. California Department of Public Health has

SECTION 3 GROUNDWATER RESOURCES

Chlorate may be introduced to the environment as a byproduct of hypochlorite used for disinfection or as an herbicide.

USEPA has established a health reference level of 210 µg/L for chlorate. Chlorate levels in untreated water samples collected from SCWA supply wells in 2013 and 2014 ranged from non-detect at the detection limit of 20 µg/L to 989 µg/L. The average concentration in upper glacial supply wells was 223 µg/L.

posted a notification level of 1 µg/L based upon an evaluation of new evidence of dioxane's carcinogenic activity in animals, and the limits of the current standard analytical detection.

SCWA has been analyzing well samples for 1,4-dioxane since 2003. Testing performed by the SCWA in 2013 and 2014 identified the presence of 1,4-dioxane at low levels in approximately 45 percent of the wells tested in 2013 and 2014 as illustrated by Figure 3-30. The contaminant was detected in wells screened in both the Upper Glacial and the Magothy aquifers. 1,4-dioxane was found in 53% of the Upper Glacial supply wells tested at concentrations ranging from the detection limit of 0.07 µg/L up to 3.02 µg/L and in 39% of Magothy wells at concentrations ranging from the detection limit of 0.07 µg/L up to 15.2 µg/L.

Chlorate

Chlorate may be introduced to the environment as a byproduct of hypochlorite used for disinfection, or as an herbicide. Chlorate is used as a decoloring or bleaching agent in food (e.g., flour) production, and may be introduced indirectly from food packaging. When used as a pesticide, sodium chlorate targets broadleaf weeds. It is highly soluble, with a high runoff and leaching potential (The Potential Regulatory Implications of Chlorate, AWWA, 2014). USEPA has established a health reference level (HRL) of 210 µg/L.

Samples collected from untreated water at SCWA community supply wells in 2013 and 2014 revealed an average concentration in Upper Glacial wells of 223 µg/L. Chlorate levels in individual raw water samples from Upper Glacial wells ranged from ND at the detection limit of 20 µg/L to a maximum concentration of 989 µg/L.

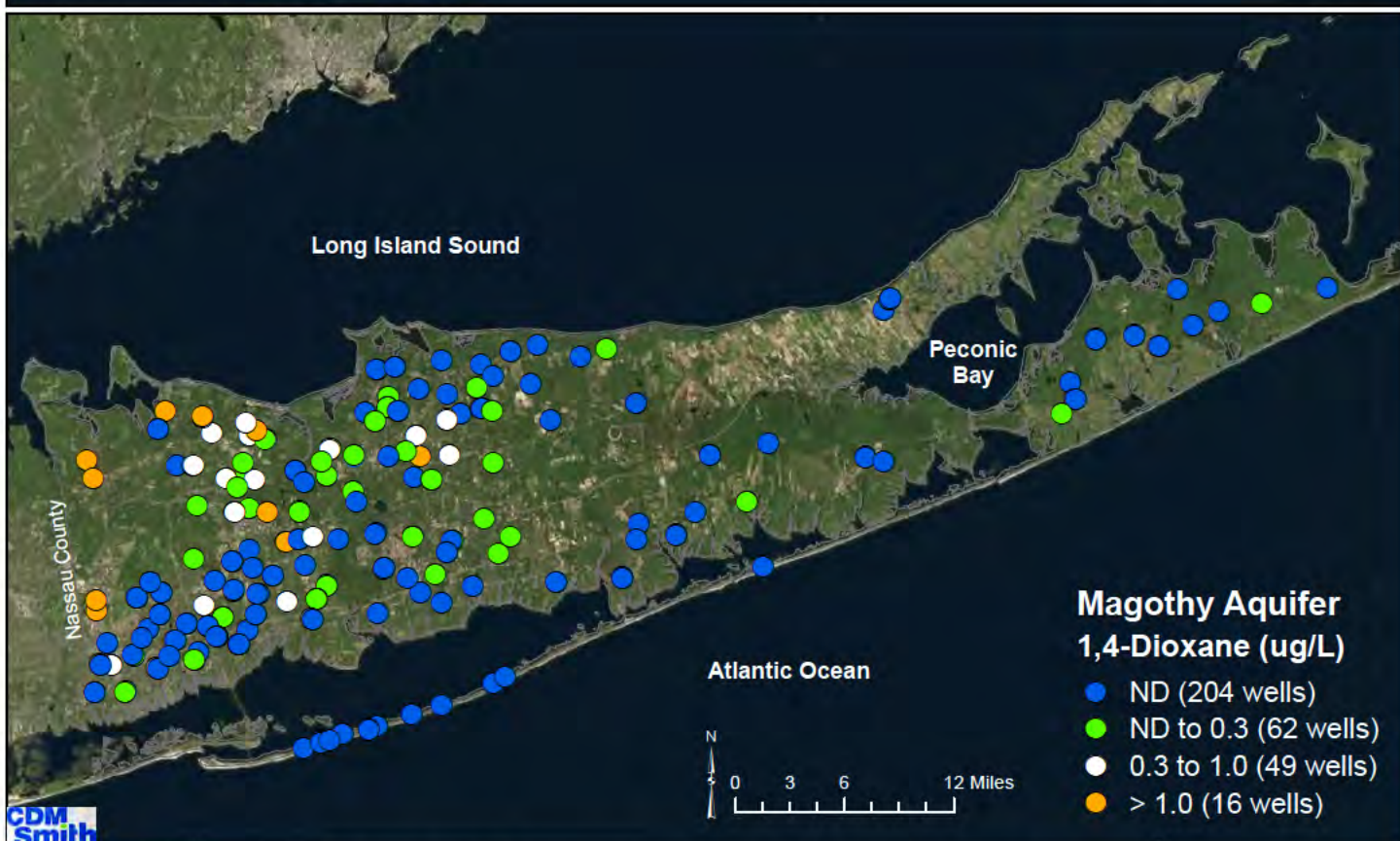
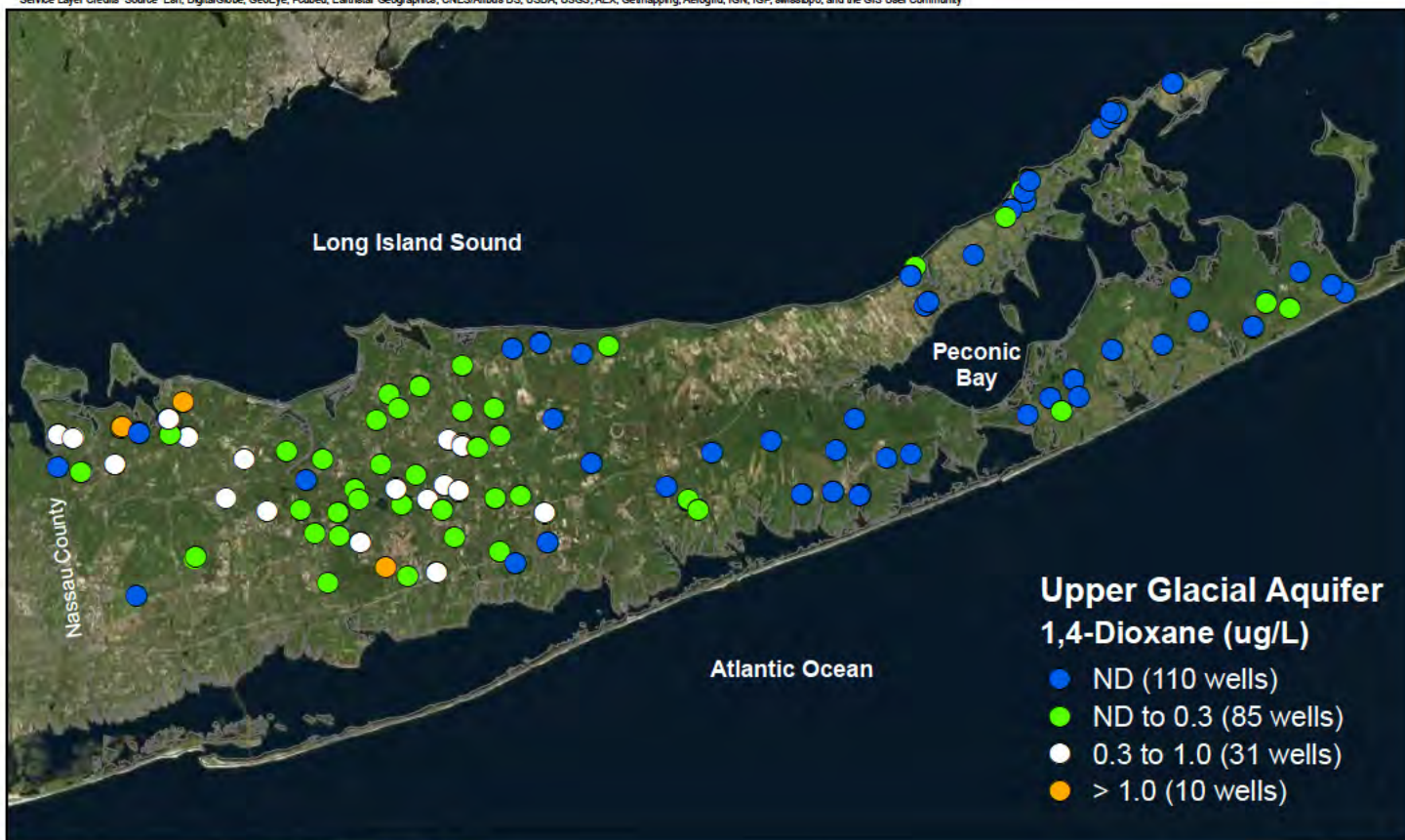
Hexavalent Chromium

Chromium is a naturally occurring metal that can occur as trivalent chromium (Cr-3) and hexavalent chromium (Cr-6). The presence of low levels of Cr-6 in groundwater can be naturally occurring, or can result from industrial processes. While there is no specific MCL for Cr-6, USEPA has established an MCL of 100 µg/L for total chromium. Between January 2013 and October 2014, the results of SCWA public supply well monitoring for Cr-6 ranged from non-detect at < 0.030 µg/L to 11.7 µg/L with an average concentration of 0.48 µg/L. Cr-6 has a high mobility in groundwater due to its anionic nature. The average Cr-6 level in untreated samples collected from the SCWA distribution system during the same time period was 0.36 µg/L.

Contaminants of Concern from Composting Facilities

After SCDHS identified contaminants above drinking water standards in samples collected from a private drinking water supply well, SCDHS, NYSDEC

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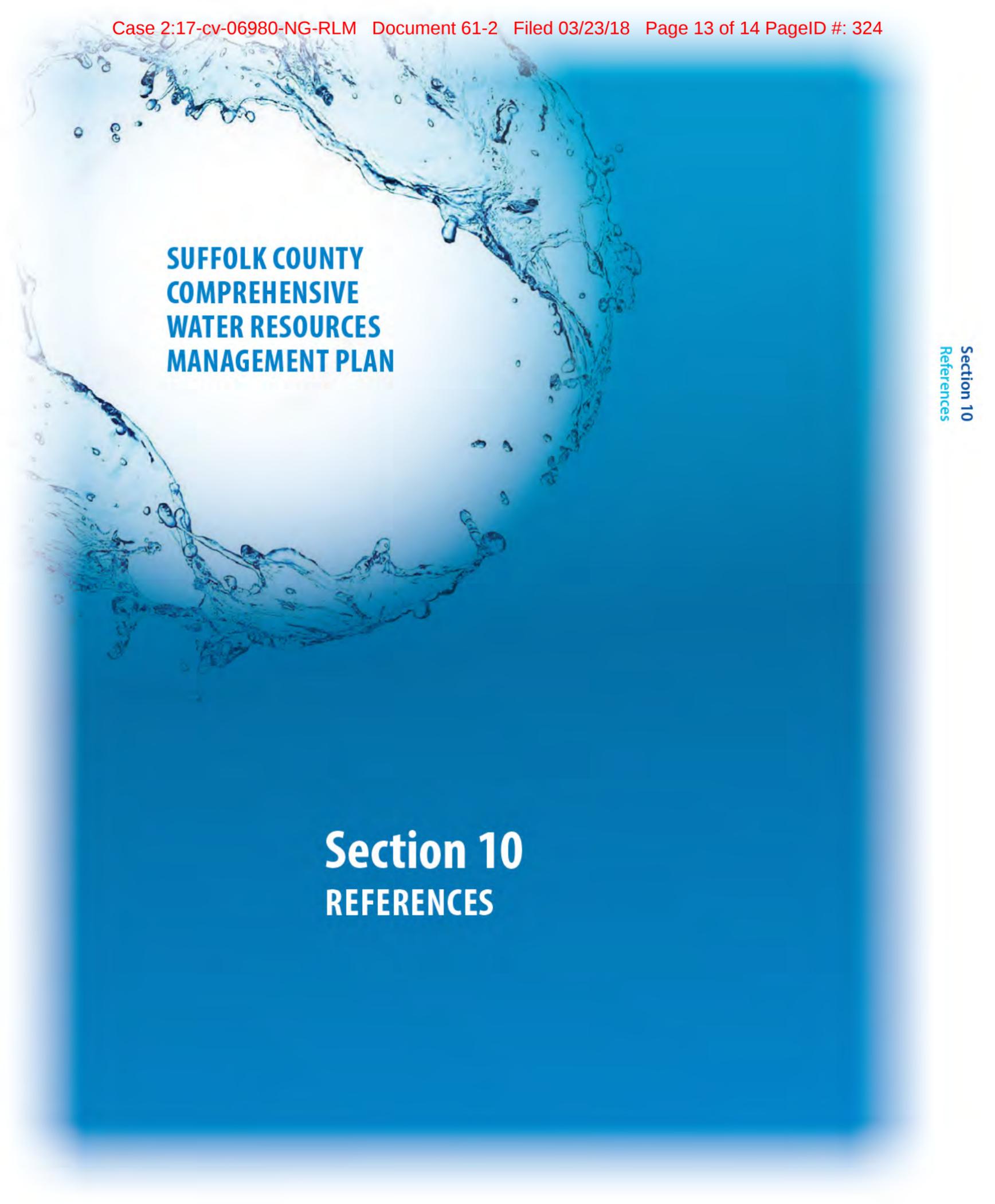
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**Average Concentrations of 1,4-Dioxane
in the Upper Glacial & Magothy Aquifers
Suffolk County Water Authority Wells (2013-2014)**

Suffolk County Comprehensive Water Resources Management Plan

Figure 3-30



**SUFFOLK COUNTY
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**Section 10
REFERENCES**

SECTION 10 REFERENCES

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